CLAIMS

1.   A method for creating a complete logical database model by combining related database elements defined in different model segments created by different users, each of the database elements representing a database table or a column of a database table, a remote database element in a different model segment represented in a current model segment by creating in the current model segment an external database element that represents the remote database element, the method comprising:

under control of a first user,

creating a first database element in a first model segment;

under control of a second user,

creating a second database element in a second model segment;

creating an external first database element in the second model segment, the external first database element representing the first database element;

displaying in the second model segment visual indications of the second and external first database elements; and

creating a relationship in the second model segment between the external first database element and the second database element by using the displayed visual indications; and

creating the complete logical database model by,

adding to the complete logical database model the database elements from the first and second model segments;

substituting the first database element for the external first database element in the complete logical database model; and

creating the relationship in the complete logical database model between the second database element and the substituted first database element,

so that the substitution of the first database element for the external first database element in the complete logical model modifies the relationship in the complete logical database model so that it exists between the first model element and the second model element.

24

2.   The method of claim 1 including:

under the control of the first user,

creating a third database element in the first model segment;

displaying visual indications of the first and third database element in the first model segment; and

creating a second relationship in the first model segment between the first database element and the third database element by using the displayed visual indications of the first and third database elements;

adding the third database element and the second relationship to the complete logical database model; and

maintaining in the complete logical database model the second relationship between the first and third database elements.

3.   The method of claim 1 wherein the first and second database elements each represent a table, and wherein the relationship indicates that attributes of the tables are related.

4.   The method of claim 1 wherein the first database element represents a table, wherein the second database element represents a attribute, and wherein the relationship indicates that the second database element is an attribute of the first database element.

5.   The method of claim 1 wherein the second database element represents a table, wherein the first database element represents a attribute, and wherein the relationship indicates that the first database element is an attribute of the second database element.

6.   The method of claim 1 wherein the complete logical database model is an Entity-Relationship diagram that is syntactically and semantically correct such that a relational database schema can be generated from the diagram.

7. The method of claim 6 wherein neither the first model segment nor the second model segment alone is syntactically and semantically correct such that a relational database schema can be generated from either of the model segments alone.

8. A method for assembling a complete model that includes model elements from different model segments, the method comprising:

receiving an indication of a first model segment that contains a description of a first model element having a first structure, a reference to a second model element whose description is contained in a second model segment and that has a second structure, and an indication of a relationship between the first and second model elements that represents an alteration of at least one of the first and second structures; and

creating the complete model by,

retrieving the description of the second model element from the second model segment; and

replacing the reference to the second model element with the retrieved description.

9. The method of claim 8 including, after the creating of the complete model, determining whether the indicated alteration of the model element structures produces a valid model.

10. The method of claim 8 wherein the replacing of the reference to the second model element with the retrieved description includes altering at least one of the first and second structures as indicated.

11. The method of claim 8 wherein the complete model is a database model specified using an Entity-Relationship format, and wherein at least one of the model elements represents a table.

12. The method of claim 8 wherein the complete model is a database model, and wherein at least one of the model elements represents an object.

13. The method of claim 8 wherein the complete model is a network model, and wherein at least one of the model elements represents a network node.

14. The method of claim 8 wherein the complete model is specified using a Unified Modeling Language format, and wherein at least one of the model elements represents an object.

15. The method of claim 8 wherein the complete model is specified using an Object-Role Modeling format.

16. The method of claim 8 wherein the second structure includes second model element attributes, and wherein the indicated alteration is to add the first model element as an attribute of the second model element.

17. The method of claim 8 wherein the first structure includes first model element attributes, and wherein the indicated alteration is to add the second model element as an attribute of the first model element.

18. The method of claim 8 wherein the first structure includes first model element attributes, wherein the second structure includes second model element attributes, and wherein the indicated alteration is to add the attributes of the first model element as attributes of the second model element.

19. The method of claim 8 wherein the first structure includes first model element attributes, wherein the second structure includes second model element attributes, and wherein the indicated alteration is to add the attributes of the second model element as attributes of the first model element.

20. The method of claim 8 wherein the model elements and the relationship each have a visual representation that are displayed to a user.

21.   The method of claim 8 including creating the model elements and the relationship before the receiving of the indication.

22.   The method of claim 8 wherein the first model element is created by a first user, and wherein the second model element is created by a second user.

23.   The method of claim 8 wherein the first and second model segments are distinct files.

24.   The method of claim 8 wherein at least one of the first and second model segments is part of a pre-defined library of model elements.

25.   A computer-readable medium whose contents cause a computer system to assemble a complete model that includes model elements from different model segments by performing the method comprising:

receiving an indication of a first model segment that contains a description of a first model element having a first structure, a reference to a second model element whose description is contained in a second model segment and that has a second structure, and an indication of a relationship between the first and second model elements that represents an alteration of at least one of the first and second structures; and

creating the complete model by,

retrieving the description of the second model element from the second model segment; and

placing in the complete model the description of the first model element from the first model segment, the retrieved description from the segment model segment, and the indication of the relationship between the descriptions of the first and second model elements.

26.   The computer-readable medium of claim 25 wherein the contents further cause the computer system to verify completeness of the complete model.

28

27. The computer-readable medium of claim 25 wherein the contents further cause the computer system to, under control of a user, create a description of a first model element in a model segment, create in the model segment a reference to a second model element whose description is contained in another model segment, and create an indication of a relationship between the first model element and the reference.

28. The computer-readable medium of claim 25 wherein the contents further cause the computer system to display to a user visual representations of the model elements, the reference, and the relationship.

29. The computer-readable medium of claim 25 wherein the computer-readable medium is a data transmission medium transmitting a generated data signal containing the contents.

30. The computer-readable medium of claim 25 wherein the computer-readable medium is a memory of a computer system.

31. A computer system for assembling a complete model that includes model elements from different model segments, comprising:

a user input device able to receive an indication of a first model segment that contains a description of a first model element having a first structure, that contains a reference to a second model element whose description is contained in a second model segment and that has a second structure, and that contains an indication of a relationship between the first and second model elements that represents an alteration of at least one of the first and second structures; and

a model creator able to create the complete model by retrieving the description of the second model element from the second model segment and replacing the reference to the second model element with the retrieved description.

32. The computer system of claim 31 wherein the model creator is further able to verify completeness of the complete model.

33.   The computer system of claim 31 including a model segment creator able to, under control of a user, create a description of a first model element in a model segment, create in the model segment a reference to a second model element whose description is contained in another model segment, and create a relationship between the first model element and the reference.

34.   The computer system of claim 33 wherein the model segment creator is further able to display to the user visual representations of the first model element, the reference, and the relationship.

35.   A method for creating one of multiple model segments that are to be assembled into a complete model, the complete model including model elements from each of the multiple model elements, comprising:

receiving an indication of a first model element having a first structure;

receiving an indication of a reference to a second model element whose description is contained in another model segment and that has a second structure;

receiving an indication of a relationship between the first and second model elements that represents an alteration of at least one of the first and second structures; and

creating the one model segment by,

creating a description of the first model element in the one model segment;

creating an indication of the reference in the one model segment; and

creating an indication of the relationship in the one model segment,

so that the description of the first model element in the one model segment can later be combined with the description of the second model element from the another model segment in a manner consistent with the indicated relationship.

36.   The method of claim 35 wherein the model elements and the relationship each have a visual representation that is displayed to a user.

37.   The method of claim 35 including:

creating the complete model by,

retrieving the description of the second model element from the another model segment; and

replacing the reference to the second model element with the retrieved description.

38.   The method of claim 35 wherein the first model element is created by a first user, and wherein the second model element is created by a second user.

39.   A computer-readable medium whose contents cause a computer system to perform the method of claim 35.

40.   A method for creating a complete model that when displayed includes visual representations of model elements from different model segments and of a relationship between the model elements, the method comprising:

receiving an indication of a first model segment that when displayed contains a visual representation of a first model element, a visual representation of a reference to a second model element whose primary visual representation is contained in a second model segment when displayed, and a visual representation of a relationship between the visual representations of the first model element and the reference; and

creating the complete model by,

retrieving from the first model segment indications of the visual representations of the first model element and the relationship;

retrieving from the second model segment an indication of the primary visual representation of the second model element; and

replacing the indication of the visual representation of the reference with the retrieved indication of the primary visual representation,

so that when the complete model is displayed, the visual representation of the relationship will indicate that the relationship exists between the visual representation of the first model element and the primary visual representation of the second model element.

31

41.   The method of claim 40 wherein each of the model elements have a structure that is indicated by the visual representation for that model element.

42.   The method of claim 41 wherein the relationship alters the visual representations of at least one of the model elements.

43.   The method of claim 40 including creating the model elements and the relationship before the receiving of the indication.

44.   The method of claim 40 wherein the first model element is created by a first user, and wherein the second model element is created by a second user.

45.   A computer-readable medium whose contents cause a computer system to perform the method of claim 40.

46.   A method for assembling a complete model that includes model elements from different model segments, the method comprising:

for each of a plurality of model segments,

for each model element indicated in the model segment;

determining whether the indicated model element is a reference to another model element defined in another model segment;

when the indicated model element is determined to be a reference to another model element,

determining whether the another model element has been added to the complete model; and

when it is determined that the another model element has not yet been added, adding the indicated model element to the complete model; and

when the indicated model element is determined to not be a reference to another model element,

adding the indicated model element to the complete model; and

for each reference to the indicated model element that exists in the complete model, replacing the reference with the added indicated model element,

so that references to other model elements in the model segments are replaced in the complete model with the other model elements.

47. The method of claim 46 including, before the adding of the indicated model element to the complete model when the indicated model element is determined to not be a reference to an external model element:

determining whether the indicated model element has been added to the complete model; and

when it is determined that the indicated model element has been added to the complete model, signaling a multiple definition error for the indicated model element.

48. The method of claim 46 including:

after the adding of the indicated model elements to the complete model from each of the plurality of model segments,

determining for each of the added indicated model elements whether the indicated model element is a reference to an external model element; and

when the indicated model element is determined to be a reference to an external model element, signaling an unresolved reference error for the indicated model element.

49. The method of claim 46 wherein each of the model elements have a visual representation that is presented to a user when the complete model is displayed.

50. The method of claim 46 including creating the model elements before the adding of the indicated model elements to the complete model from each of the plurality of model segments.

51.   The method of claim 46 wherein the plurality of model segments are created by multiple users.

52.   A computer-readable medium whose contents cause a computer system to perform the method of claim 46.

53.   A method for creating a complete model by combining multiple model elements and model element relationships created in multiple model segments, comprising:

creating a first model element and a second model element in a first model segment;

creating a first relationship between the first model element and the second model element;

creating a third model element in a second model segment;

creating an external first model element in the second model segment, the external first model element representing the first model element;

creating a second relationship between the external first model element and the third model element; and

creating a complete model from the first and second model segments by,

adding the first, second and third model elements and the first and second relationships to the complete model; and

substituting the first model element for the external first model element in the complete model so that the second relationship reflects a relationship between the first model element and the third model element.

54.   The method of claim 53 wherein each of the model elements have a visual representation that is presented to a user when the complete model is displayed.

55.   The method of claim 53 wherein the first and second model segments are created by different users.

56.   A computer-readable medium whose contents cause a computer system to perform the method of claim 53.

57.   A computer-readable medium containing a model segment data structure such that a complete model can be created from multiple model segments, the data structure comprising:

    at least one description of a model element; and

    at least one reference to another model element whose description is contained in another model segment.

58.   The computer-readable medium of claim 57 including a description of a relationship between a described model element and a reference to another model element.

59.   The computer-readable medium of claim 57 wherein each of the model elements have a structure including at least one attribute.

60.   The computer-readable medium of claim 57 wherein the computer-readable medium is a data transmission medium transmitting a generated data signal containing the data structure.

61.   The computer-readable medium of claim 57 wherein the computer-readable medium is a memory of a computer system.